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President Barack H. Obama
The White House
1600 Pennsylvania Ave. NW
Washington, DC 20500

Greetings President Obama,

Over these very fast-paced past couple of months, I have watched with a guarded optimism of the direction that your Administration is leading the country in relation to our energy policies. Our increased focus on energy efficiency as well as further developing of "green" energy sources, for purpose of decreasing our dependence on fossil fuels is an outstanding and exciting thing to see. That being said, we know that as a technology-based society our need for energy will grow overall that will require augmentation with other sources of abundant energy. Even as electric vehicle technology gets better developed, they too, will put new demands on our electrical supply network that does not currently exist today.

In looking at the full spectrum of energy production methods we have, I would like to take a few moments and talk specifically about our nuclear power generation plants, and the policies driving them. As you know, nuclear power has the major advantage that they do not burn fossil fuels which both harm the atmosphere as well as adds to the dependence on oil from foreign countries. In that same vein however, we also understand the risks inherent with a nuclear power plant, as illustrated first by Three Mile Island, and again by Chernobyl. In addition, the use of nuclear plants as they stand today essentially trades one pollutant with another in the form of highly toxic and hazardous high-level nuclear waste. I cannot, in good conscience, support such a dangerous technology that creates such a quantity of waste that is lethal to anything contacting it and that must remain secured for thousands of years. If the safety factor and waste issue were to be properly addressed, I see our use of nuclear power as the eventual answer to our issues surrounding fossil fuels.

Now, I am not a nuclear scientist by any stretch of the imagination. What I know, I have learned from chemistry classes back in school, and from books and scientific articles found on the Internet. I'm sure that there are some aspects of my self-education that are lacking as some aspects of nuclear reactors are not public information, and there may be policy issues that play in that I may not be aware. Still, I set out first out of curiosity to more fully understand the waste and safety issues of a nuclear plant, and then to see if there was any research into "making it better" to be a more viable solution for us as a people. What I found was surprising and encouraging!

Our standard nuclear plant design using light-water reactors (LWR) is the basis of our problems with nuclear power plants: firstly, the operation of the reactor depends on water bathing the core at over 2,000 PSI of pressure to keep it cool. If pumping of the water fails or is disrupted, the result is a core meltdown. If there were to be a breach of containment, then that highly pressurized water becomes radioactive steam, which I don't have to say how bad that could be. Water is also corrosive to the metals that hold it. I remember a number of years back, disaster was narrowly averted when a piece of plumbing was discovered to have nearly completely corroded through following lax inspection

practices. Secondly, LWR's are thermal-based reactions, meaning that they consume the nuclear fuel and the reaction is sustained by slower, less energetic neutrons in the chain reaction. The drawback to this is that as the fuel becomes impure through the decay of uranium, its efficiency drops and the reactor is unable to produce sufficient levels of heat. Of the highly enriched fuel used for a plant, only a small percentage is actually consumed. It's my understanding that anywhere from 1-3% of the enriched uranium is consumed before the fuel rod is no longer viable and must be replaced.

Speaking of uranium fuel, one cannot help but draw parallels with fossil fuels and wonder if we are not setting ourselves up to be in the same end situation of consuming the world supply of it, and paying a premium to foreign countries where the raw uranium is mined from in the form of yellowcake. We have to face that uranium is also a finite resource in the world. The planet's use of it will grow over time until we use it all up. Using a reactor that inefficiently uses only 1-3% before throwing it away is magnitudes worse than even the lowest efficiency power plants burning fossil fuels today. Our need to more efficiently use the resources we have would also need to be added to the "wish list" of a proper nuclear plant.

I learned of a type of reactor that is called a "fast neutron reactor" that is employed in other countries such as Japan, France, and Russia to name a few, that would seem to have many benefits. Because the neutrons in the reactor are not moderated or slowed down (hence the name), the reaction is more sustainable, and gives rise to extra neutrons that can be used to transmutate fissile materials that would not normally be viable into either sustaining nuclear fuel or into a less-harmful byproduct. These reactors do not use water in their cooling loops; instead they use various types of liquid metals, and this particular reactor is termed a Liquid Metal Fast Reactor (LMFR). The use of metal coolant enables the cooling loop to operate at atmospheric pressures, negating the safety risks with a pressurized system. As an added benefit of the reactor design, it is intrinsically safe; meaning a failure of coolant pumping will not cause a catastrophic meltdown. A LWR reaction will get worse as a core overheats and the neutron-slowing water burns away, a LMFR will continue to have coolant flow just by convection, and because the fuel is not oxide-based as in a LWR, heat conductivity is much better, which makes meltdown a very difficult thing, if not impossible.

The other benefit of a LMFR is that it can be configured to be a "burner" or a "breeder" of fuel. In a "burn" configuration, the reactor can consume those things that we have problems with today: old nuclear weapon cores and waste from existing LWR reactors. As a "breeder", the reactor can actually make more fuel than it consumes, which makes the dependence on uranium mining go away almost entirely! The waste product from a LMFR is significantly lower-level and is hazardous only for years, opposed to eons.

There is one significant hurdle to the use of LMFR's in the United States, however, and it would seem to be primarily a policy decision. As mentioned, a LMFR can create more fuel than it consumes by converting less-fissionable materials and transmutating them into plutonium-239. In fact, the only current fast reactor I have found in operation by the US is owned by the Department of Defense for purpose of making plutonium for nuclear weapons. It is my understanding that ever since the Carter Administration, there has been executive orders on the record banning the research into, and employment of these types of reactors over fear of proliferation and terrorists. Over the years, there have been great strides made in the refining and reprocessing of fuel that creates LMFR fuel, which while highly fissionable in the reactor, is "poisoned" with impurities that would make the creation of a nuclear weapon a virtual impossibility. In addition, pyroprocessing techniques exist that allow for all fuel operations to be carried out on-site of the plant facility, which completely removes the risks

involved in trafficking of nuclear materials from location to location and falling into the wrong hands. If today's waste products were all directed to a central facility such as Yucca Mountain, I would have even greater fear that it would make for an easy target for theft, opposed to on-site processing where the materials never leave the grounds.

In 2008, the IAEA published a paper stating that the pool of knowledge was dwindling on fast-reactor technology due to the stagnation of the research and those formerly involved with this type of reactor design are now old, retiring, and dying off. In 1994, a research reactor was mothballed by President Clinton, only three years before it was scheduled to come online. It would appear that the US is falling behind the rest of the world in this form of technology, and I share your passion that the US does not like to be second to anyone, but I feel our policies, blind fear of terrorists and anything "nuclear", is holding our development back. With the public more accepting of nuclear technology, and of our significant experience with nuclear plants, now would be the perfect time to build and demonstrate a plant that is safe and clean.

In closing, with the US's collective brain-power in this technology trending downward, and the country at a crossroads with our direction for new and creative forms of energy production, I feel strongly that now is the time that we take a new, objective look at this form of reactor. I'm sure that there are many hurdles that still need perfecting. We are a very resourceful country and I think that once research has ramped up again, these challenges can be met. With a new generation of nuclear power plant ushered in by your Administration that is safer, efficient, and extremely clean, we will be able to - for the first time - completely eliminate any dependencies to other countries for our energy needs. I ask that you carefully weigh this option with the hopes that we will see policy shift in favor of researching and utilizing this technology.

Thank you so much for your time.

Warm regards,

Andrew M. Wyman

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